

ABSTRACT

A MEMS optical device includes a MEMS image array and a self-aligned microlens array. The MEMS image array includes a number of individual channels. The microlens array includes individual microlenses, each of which is
5 associated with one of the channels of the MEMS image array. The microlens array is formed directly on the MEMS image array using semiconductor fabrication techniques. Each microlens is automatically aligned with its respective channel within the image array. The need for precise and expensive manual alignment of the MEMS image array and the microlens arrays is avoided.
10 Improvements in the fill factor and the transmission efficiency of the optical device are realized. Further, by tailoring the refractive index of the lens relative to both the substrate and the ambient air, the total internal reflection phenomenon can be exploited, for additional improvement in the transmission efficiency of the optical device.